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When Stakeholders Perceive Threats and Risks Differently: the Use of Group Support Systems to Develop a Common Understanding and a Shared Response

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When Stakeholders Perceive Threats and Risks Differently: the Use of Group Support Systems to Develop a Common Understanding and a Shared Response*

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Abstract

We present a multi-phased action research project conducted at the department of Information Management - Customer Support and Operations in a large multi-national company. This department is in charge of IT service continuity and was asked to develop an IT response and recovery plan that had to be integrated within the organization's overall business continuity plan. The department's key challenge was to develop a response plan which incorporates the perspectives of the business managers whose perception of the threats and associated risks differed significantly from that of the IT managers. To develop such a shared response plan, we used group support systems and cognitive mapping techniques to identify both stakeholder groups' perceptions of IT threats and risks. This allowed us to raise awareness in both groups for the other group's different perspectives. We aggregated the responses into a shared response and recovery plan, representing the views of both groups. Our research has made clear to the stakeholder groups involved the necessity of sharing information and developing awareness to formulate a shared disaster recovery plan for ensuring business continuity and recovery.

KEYWORDS: Business Continuity, cognitive maps, group support systems, group decision support systems, disaster recovery plans.

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1. INTRODUCTION

Organizations have become increasingly dependent on Information Technology (IT) to run their business processes, to manage workflows, and to communicate. The loss of the availability of a critical Information System (IS) can disrupt business continuity and harm the organization's critical business processes, and with it its reputation and financial prosperity. Business continuity is intrinsically related to the businesses' IT and IS services continuity. Ensuring continuity of IT within an effective timeframe following a disruption or disaster to maintain or get business processes running is essential for the organization's survival (Doughty, 2002; Suh and Han, 2003). As such, identifying the risks that may cause a disruption in IT continuity is essential for an organization. Yet even more crucial is to develop and plan effective and efficient recovery scenarios that facilitate the timely recovery of the IT facilities. For a recovery plan to be beneficial to an organization, it is necessary to understand the structure and the organization of both the business processes and the related IT units. Indeed, risk management research has shown that the interaction between different types of risks can amplify the damage to a business process and generate a crisis for the entire organization (Williams et al., 1997). Business disasters and crises are focusing events that trigger attention to a problem and its solution, and are generally accompanied by drawing negative attention to the firm and the underlying problem revealed by the event (Baumgartner and Jones, 1993). However, it is a misjudgement that focusing on risk management only reveals the vulnerable and weak parts of an organization, or could be a sign of a poor situation. On the contrary, thinking about risk management upfront allows an organization to plan its response and improves its strength.

This paper presents action research that was conducted at a large multi-national organization for the department of Information Management Customer Support and Operations (IM\CS&O). Although a business on its own, the department studied is part of a larger organization, with which it shares some IT services. The IM\CS&O department is, however, in charge of IT service continuity and has to develop an IT disaster recovery plan which must be an integral part of the organization's overall Business Continuity plan. To guarantee a high level of IT-service continuity, IM\CS&O commissioned an investigation into the threats to its IT services in relation to its business processes, and into the possibilities to prevent and/or mitigate these threats. Although the services provided by the IM\CS&O department affect the continuity of four main business processes, the investigation reported here deals with on-site or internal IT disruptions only, not with the systems shared with others. To identify and reduce the impact of IT disasters on business continuity, it is crucial to conduct a thorough analysis of the potential threats and risk, and to raise awareness on the need for appropriate disaster recovery scenarios and plans. The purpose of this article is to describe the methodological steps that were taken to generate the IT services stakeholders' awareness for disaster recovery scenarios and plans, and to report on the information gathering processes that were conducted for their development. These steps were taken in four consecutive phases as follows. In the first phase of our research plan, interviews have been conducted with 20 business and IT managers in order to gather the IT and business views on continuity and to better understand the gaps between these two communities. In the second phase, two workshops were organized. During the first workshop, eight businesses and IT managers brainstormed with the support of Group Support System (GSS) technology on the threats to the organization's IT services and how these could be evaluated by means of an economic decision model. During the second workshop, a different group of ten business and IT managers was asked to build a disaster recovery scenario with the support of Decision Support System (DSS) technology. With the help of the DSS, each participant built his or her individual cognitive map representing his or her personal view on an IT threat that was identified in the preceding Phase I of the project. The individual cognitive maps were then discussed in two subgroups and aggregated into two combined cognitive maps, representing the best disaster recovery plan for the IT threat. Phases III en IV of our research plan, which will not be further discussed in this paper, included the development and application of a new risk measurement instrument (the risk filter), and an elaborated economic cost model.

The settings of this study are presented in the following Section. First, the business continuity process at the department is explained, and the group support systems used for our purposes is defined. In Section 3, our research method is introduced and the cognitive maps that have been developed by the two distinct stakeholder groups, as well as the combined view, are presented. The use of these maps to develop a shared response plan is the main result of this research. Section 4 concludes with recommendations for the systematic development of threat analysis and disaster recovery planning in organizations.

2. BACKGROUND

2.1. BUSINESS CONTINUITY AND IT SERVICES DISRUPTIONS

Business continuity is intrinsically related to IT services continuity. As IT systems have become more and more integrated, and IT and business processes become increasingly interdependent, an organization's flexibility to deal with

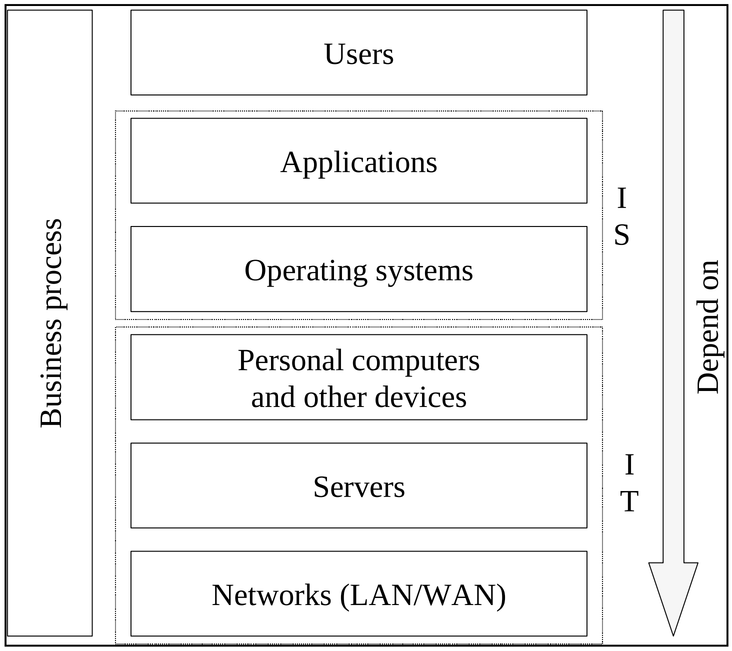

Figure 1 Main dependencies between IT and Business processes

discontinuity has nowadays diminished considerably. Figure 1 shows the main layers of IT business process dependence in an organization. As was stated above, the disruption of any critical IT service can seriously harm business continuity. This is beyond the loss of production only, as a disruption may also harm the business' reputation and thus its long-term financial prosperity. In this paper, a threat is defined as an event that will harm the business financially when it occurs. The risk associated with a threat is the probability that the threat realizes at a particular time; the seriousness of a threat is usually related to its duration. For example a power outage of a few minutes for Customer Services is a possible threat, but the financial consequences of this risk can normally be neglected. Indeed, most business managers indicated that a brief disruption in IT services can also be turned into an advantage by reducing the backlog in administrative paperwork. A power outage of several days on the other hand will be harmful, and will affect various divisions such as production, logistics or worldwide customer service. A crisis can be defined as a decision situation with serious financial consequences that is characterized by an element of surprise (sudden realization of threat) and limited time to take the correct decision. Precautionary measures and restoration processes have to be identified and organized in order to develop efficient crisis recovery plans. Clearly, any serious IT crisis not only causes immediate short-term problems, but can harm the business process in the long term as well. In our case, as the organization has only a limited number of internationally operating competitors, a serious disruption will harm its reputation as a reliable high tech company and can lead to a loss in market share. Financial consequences are numerous when business continuity is partially or fully interrupted by IT failures e.g., loss of customer orders, loss of vital data, man-hours, or too long disruptions of machinery at customer sites, to name just a few. The cost in terms of man-hours lost is fairly easy to estimate, while the loss in reputation is more difficult to determine. Similarly, outside or external threats such as a plane crash or an earthquake are always possible but their probability is more difficult to estimate. Finally, note that in our organizations' case, the consequences of a crisis may well affect stakeholders around the globe, and thus become a true disaster. It is the absence of recovering strategies that transforms a crisis situation in a disaster.

The detection of IT threats to the key business processes is somewhat easier. Mathematical modeling techniques, research of historical data from within or outside the company, expert advice are some of the possibilities available to determine threats and the duration and financial impact of their effects. It is not so evident however to determine what expertise in this respect really is meaningful, and who the real experts are. In this case, the authors decided to collect information on threats and their associated risks by interviewing senior managers and staff members who are considered as the key players in the organization. This information, together with a concise description of the business processes and its relations to the IT systems, will be used to develop efficient and effective disaster recovery plans as described below.

2.2. Crisis Response and Group Decision Support Systems

The quality of the response to a crisis is highly dependent on the social perception of the individual person or group in charge. It has been well documented that the probability of defective group decision-making, for instance group think, is higher when the situation is very stressful and the group is too cohesive and socially isolated. The participants involved in the decision are cognitively overloaded and the group fails to adequately determine their objectives and alternatives, fail to explore all the options and also fail to assess the risks associated with the group's decision itself. Groupthink is "a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members' strivings for unanimity override their motivation to realistically appraise alternative courses of action" (Janis, 1982).

Decision Support Systems (DSS), Group Decision Support Systems (GDSS) and Group Support Systems (GSS) methods and technologies have been developed over the last few decades to support and facilitate groups in handling complex problems (Jessup and Valacich 1993; Hiltz and Turoff 1993; Turoff et al., 2004).

Despite differences in the conceptualization of GSS facilitation, various approaches agree on the necessity to facilitate the interactive sharing and use of information amongst group members (DeSanctis and Gallup 1987; Nunamaker and Vogel 1989), to facilitate the development of new beliefs in groups in order to support processes of negotiation of meanings between participants to solve problems and/or to reach consensus (Eden and Ackermann 1998).

GSS environments such as Electronic Meeting System (EMS) support computer mediated communication processes, facilitate Group Decision Making (GDM) and problem solving via anonymous activities, support sharing of idea or information-exchange and development of consensus and creativity (Nunamaker and Vogel, 1989, Nunamaker et al. 1991; Dennis et al., 1991). GroupSystems© is a well known GSS technology that supports the technique of anonymous brainstorming, as well as idea generation, organization, planning, and analysis of information to facilitate group collaboration. GSS methods like Strategic Options Development Analysis (SODA) and Jointly Understanding Reflecting and Negotiating strategY (JOURNEY) are designed to facilitate conversational processes amongst members to create new knowledge and new options through the development of new shared meaning in order to support problem solving (Eden and Ackermann 1987, 1992, 1998). These methods and associated software tool Decision Explorer© are based on techniques of cognitive mapping. Decision Explorer and the SODA methodology have been used widely in risk management projects to develop shared meanings among members of a group confronted with a crisis situation (Ackermann et al., 1983). Cognitive Mapping is a technique that has been developed over a long period of time and through its application has demonstrated its usefulness for Operational Research and Management Science in a wide variety of tasks. These tasks include providing help with structuring messy or complex data for problem solving, assisting the interview process by increasing understanding and generating agendas, and by managing large amounts of qualitative data from documents. While Cognitive Mapping is often carried out with individuals on a one to one basis, it can be used with groups to support them in problem solving (see Ackerman et al., 2004).

3. METHOD

3.1. INTRODUCTION

Traditionally, cognitions have been perceived as individual processes that are treated by the mind, provoked by a stimulus and generating a response. The cognitive development is organized in stages that are age-related (see Piaget, 1955). Later on, constructivist theories established the clear link between the influences of the social world on the individual construction of his cognition. Vygotsky wrote: "Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relationships between individuals." (1978, p.57). Constructionist theories go one step further and elaborate on the necessity and requirement of a social world for cognition to exist (Gergen, 1985). In other words, cognitions are co-constructed by social peers who when functioning as a group influence on each other perceptions of reality and cognitive production (Rutkowski and Smits, 1999). For example Papert and Harel (1991) underline the necessity of a social interpretation and social co-evaluation to generate meaning out of individual cognitions. n the context of this research, cognitions are understood as mainly social phenomena that can be activated through social brainstorming and also shared and agglomerated under the form of a graphical collective cognitive map.

3.2. PARTICIPANTS AND PROCEDURE (PHASE I): COGNITIVE MAPS

During the first phase of our research, interviews were conducted with 20 senior managers of the organization using a strict open question interview protocol based on the free association method. Individuals develop over the years and experience a personal cognitive architecture build on cognitive schemas. Those schemas are stored in memory and are composed of concepts encoded over time linked to one another. The principles of free association allow stimulating the retrieval of the information that have been encoded and stored in the memory. The interview protocol has been developed on 10 open questions developed specially to activate some very particular concepts to allow the interviewee to freely associate the concepts (e.g.; threat, risk, emergency) to events and situation that had happen in the organization (Tulving and Thomson, 1973). The goal of the interviews was to gather the views of IT and business managers on business continuity, and in this way better understand the gaps between both communities. Following the interviews a content grid analysis was done; next the not-knowing approach (Gergen, 1985; Bell 1990; Neimeyer 1993) was used as a baseline theory to built three cognitive maps, constructed by an outside observer instead of the group members. Cognitive maps obtained in this manner are sometimes called ‘wild’ cognitive maps, allowing for a very clear representation of the content grids for each interview conducted.

The resulting maps representing the overall perception of the IT and business managers on IT/Business continuity respectively are shown in Figures 2 and 3, while Figure 4 is a map combining both views related to IT/business continuity.

The links between the concepts in these maps are visualized by means of different line types which have the following meaning.

- *Straight line with arrow*: causal link to be read as “lead to” with a possibility to indicate the indirection of the link amongst the concepts
- *Straight link with arrow associated to a T*: Temporal links that convey a time related-relationship amongst the concept.
- *Straight link with arrow associated to a ‘&’*: Logical link that convey a causal relationship that implies both concepts to be difficulty separated.
- *Dashed line with arrow*: causal link to be read as “lead to” but describes as less important by the participant than the causal link (straight full arrow).

Figure 2 presents the view of the business managers on continuity and indicates that the numerous consequences of a threat are well known in terms of customer relationship and cost. On the other hand, business managers grossly underestimate the possible threats of IT service failures. The map shows that for many of the facts (another name for a threat) indicated and of their consequences, the business group knows hardly any solutions, other than “try to catch up with time”, “write things done on paper and enter later” or “call the IT helpdesk”.

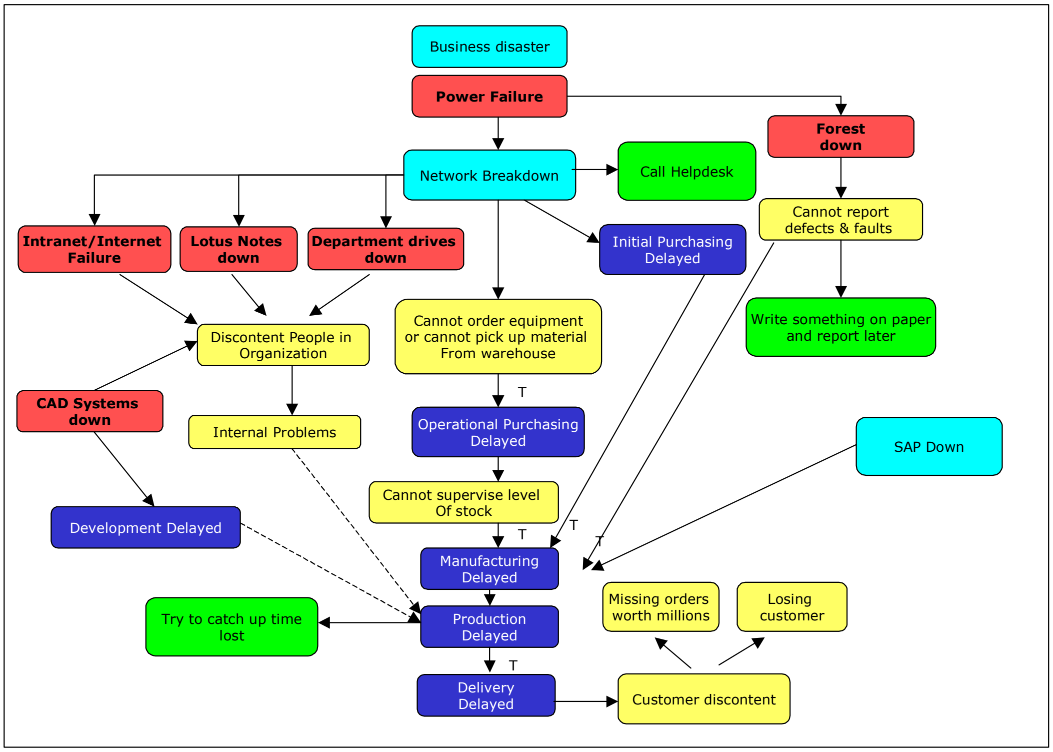

Figure 2 View of Business Managers on Continuity

Figure 3 shows the view of the IT managers on continuity. Clearly, IT managers think in terms of IT solutions, but grossly underestimate the impact on customers and business processes. Still, interesting to note is that "think of an emergency solution" an hardly be called an efficient solution to the problem. It is also clear that the business solution "call IT helpdesk" is not realistic, because in case of an IT failure the "helpdesk is unavailable".

Figure 4 presents the combined view of both stakeholders on business continuity. When comparing it to the map representing the IT view it is striking that most solutions brought forward by the business managers are actually not applicable (also see Figure 3). Business thinks in terms of time (indicated with the '*T*'-links in the map), while IT services thinks mainly in terms of logical links or/and their consequences (indicated with the '*&*'-links in the map). This latter view is typically technology driven. It is interesting that a simple combination of both maps already gives a clear representation of the causal, temporal, and logical links between threats and their consequences as well as the unknown links to both protagonists represented in light blue in figure 4.

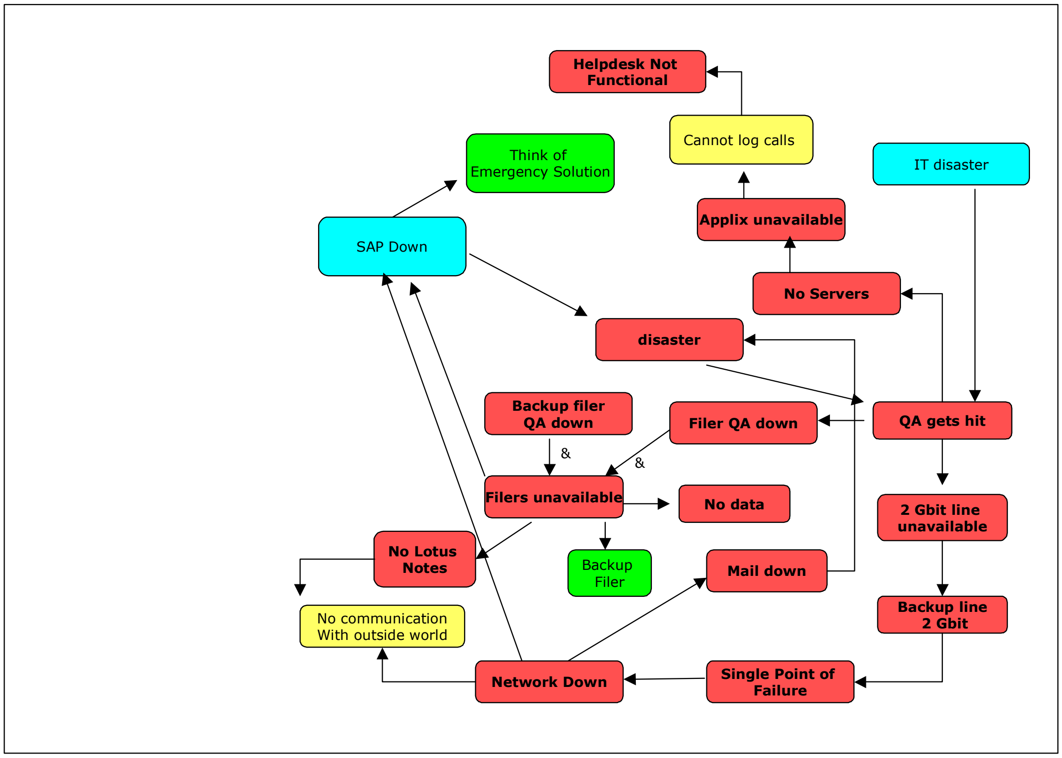

Figure 3 View of IT managers on continuity

These cognitive maps were then used during a presentation to demonstrate the apparent 'cognitive gap' between the two stakeholder groups, but also to emphasize the need for more awareness and collaboration to tackle this complex problem. The combined map was also used to reinforce shared meanings between both professional groups that belong to the same organization, share a common interest in IT/business continuity, but seem to lack basic understanding of each others' work. Having both groups of participants communicating and made aware of the situation was a first important step to their commitment to the following two workshops.

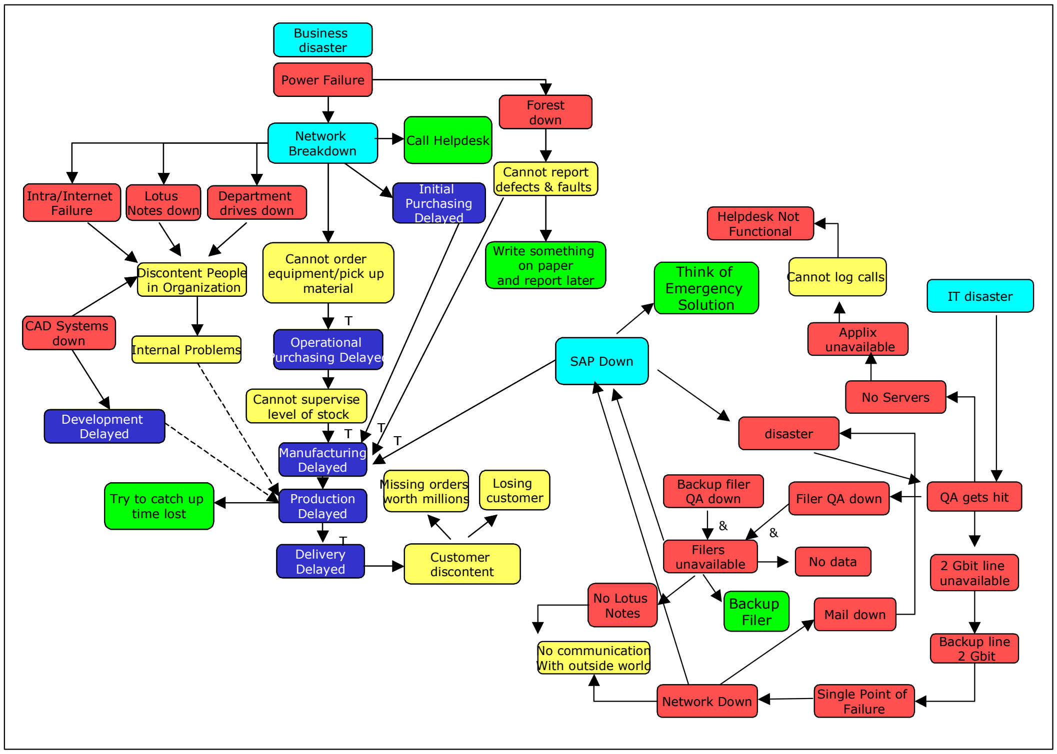

Figure 4 Combined view of Business (right) and IT (left) managers

3.3. PARTICIPANTS AND PROCEDURE (PHASE II): BRAINSTORMING AND SCENARIO BUILDING

3.3.1. SESSION I: BRAINSTORMING USING GROUPSYSTEMS

The eight participants involved in a 3-hours brainstorming group session were managers in charge of Information Management, Development, and Sales. This session was organized to brainstorm on critical business processes and their dependencies on IT. The electronic agenda constructed in GroupSystems consisted of three main 'categorizers' or categories. The first categorizer was related to the depedencies on IT within the organization. Questions on topics such as employee dependencies on information technologies and services to perform their task, the effect of IT failure on the employee's work and productivity within and between departments, as well as preventive/recovery measures and processes for IT failure were used as support to brainstorm on this categorizer. The second categorizer allowed the participants to brainstorm on the quantitative classification of threats of the IT service continuity, including cost associated to failure, reputation, and share values. The third categorizer supported a brainstorming session on the probability of a threat occurring, its risk, and the method that should be used to have a realistic view on this occurrence (e.g., historical data analysis versus experts opinions).

The results of the vote sessions on the 15 major threats were rated on a 10-point scale (1 is lowest impact/likelihood and 10 is highest impact/likelihood), and are shown in Figure 5. Given their relatively important impact and likelihood and their common occurrence in organisations worldwide, the threats of a worm/virus attack (external cause) as well as a power outage (internal cause) are explicitly shown on the plotted map. For confidentiality reasons however, the most severe threats (i.e., threats 2 and 11) cannot be further discussed in this paper.

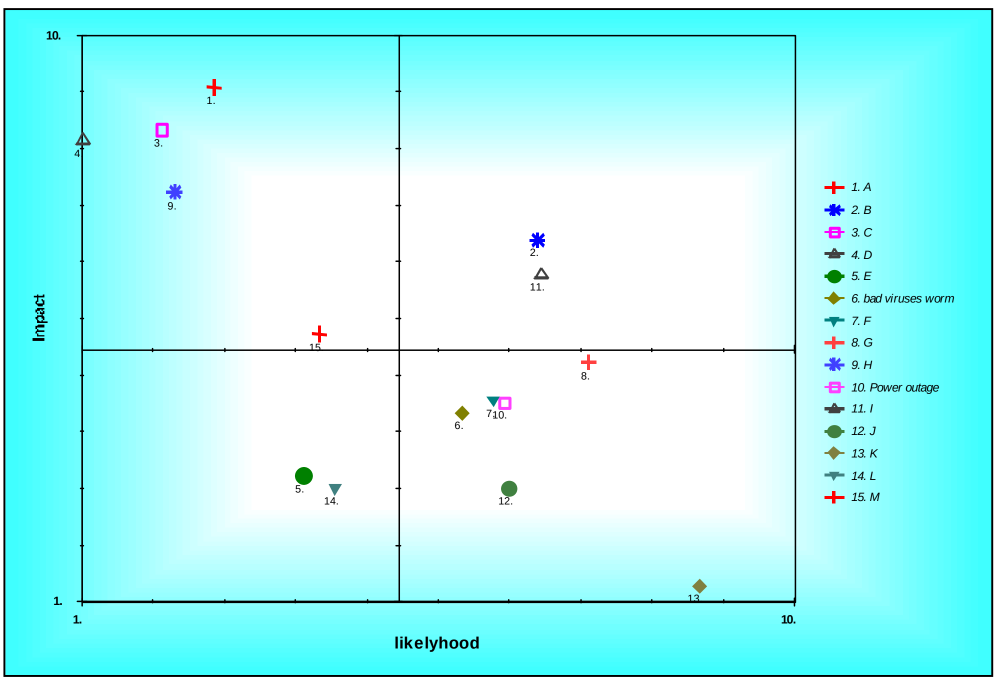

Figure 5 Impact - likelihood plot

3.3.2. SESSION II: SHARED MEANING AND RECOVERY PLAN USING DECISION EXPLORER

Another group of ten senior business and IT managers was invited 4 weeks later to participate in the cognitive mapping session. The participants were randomly attributed an IT disaster scenario that described either a worm/virus attack or a power outage within the organization, two common and moderately likely events with moderate impact that had been identified during the first session. In the first phase of the 4-hours session, the 10 participants built their individual cognitive maps representing the best recovery plan strategy to the disaster presented. The participants were asked to focus on the consequences of the disaster on the business line continuity and recovery measures to be taken. Most participants built their individual map in about one hour. Two sub-groups of five participants were then formed to discuss their individual maps and recovery plan strategies in order to construct a combined cognitive map that aggregates the individual views. Within two hours, the participants had reached consensus and developed two combined maps for each of the IT disaster cases, as such providing an interesting structure to build recovery disaster plan.

However one of the problems the authors faced during this session was the agglomeration of the individual cognitive maps into a collective map. Indeed, in both group typical social pressure toward uniformity could be observed (Festinger et al., 1950), as well as normative and informative influence exerted by some group members in a superior social position who tried to enforce their perceptions of the correct cognitive links or concepts to the group (Deutsch and Gerrard, 1955). If in one group the exercise succeeded particularly well, it was surely the effect of one of the team members who was not cognitively self-centered and took time to include other participants' concepts. This group produced a very complete view of the situation within the company. In the other group, a more dictatorial type of leadership led to a poorer collective map and surely brought some members to surrender on the exercise.

4. CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

So far this research has made clear to the involved stakeholders the necessity to share information in order to become aware of IT threats, the risks involved and the financial consequences. The cognitive maps show that the business and IT managers had surprisingly different views on IT threats and their effects on business. Neither group is actually aware of all potential problems. The business managers know to some extend the expected cost of an IT service failure, but have no real feeling for what actually may go wrong in this respect. The IT managers on the other hand know in detail what IT systems are running, but have insufficient knowledge of the business consequences. The research process presented here and the use of GSS and DSS was crucial to start the communication process between both professional communities of practice, and to reduce the gap between antagonistic, but often complementary views. Indeed, our research brought interesting results in the form of integrated cognitive maps that, more than the combination of perspectives on IT/business continuity, activated and supported by the brainstorming session as well as the mapping session, opened the mind of the stakeholders towards shared understanding of the importance of risk management. Currently, all links between the business processes and the IT systems are identified and used to identify potential threats. Simultaneously the associated risks have been estimated as well as the expected time related costs. These will be used to get the business and IT managers at the same awareness level. If all parties agree, the results will be used to estimate the expected financial cost per occurrence. Also potential dependencies between threats will be established. With this information the IM\CS&O department can then develop risk mitigation plans and recovery scenarios.

Risk management is a topic that concerns many companies. However as stated in the introduction of the paper, focusing on risk management often reveals the weak parts of an organization and does not receive sufficient attention in most companies. From a behavioral and social perspective humans do not show the natural drive to focus on failure (Bower, 1987) and have the tendency to attribute failure to external causes and factors out of their control. Professional gaps and misunderstanding among different groups of practice reduce the perspective of the participants. Awareness supported by the approach as presented here appears to be a first interesting step towards shared meanings. In the near future, our plan is to use a networked Group Decision Support System in order to reduce social pressure effects while the participants are constructing their collective cognitive map. Group Explorer provides tools to support convergence in the group, such as its voting tool which allows group members to vote on preferred concepts and links (See Ackermann & Eden, 2001; Ackerman et al., 2004). As such, the software also alleviates the need of experienced facilitators. Another solution could be to use a Social Decision Support System (SDSS) as described by Turoff *et al*. (2002). SDSS facilitate the integration of diverse views or cognitions on a problem or a situation into a growing knowledge base and support discussed and valued consensus amongst a group of participants (Van de Walle and Turoff 2001; Turoff *et al*., 2002).

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